



The Madaba Mosaic Map as a Climate Indicator for the Sixth Century

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The Madaba Mosaic Map as a Climate Indicator for the Sixth Century*

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THE mosaic map on the floor of the ancient church of Madaba in Jordan shows the configuration of the Dead Sea as being different from that shown in the maps to which we are used. The standard maps show an elongated north basin, about 56.5 km. in length, and a shorter south basin, c. 13 km. long. The north basin approaches the extraordinary depth of 400 m., whereas the south basin is very shallow, not exceeding 6 m. in the 1930s. The two basins are separated by a low peninsula, consisting of marly strata deposited by the lake. Due to its long northern extension, this is known as 'the tongue' (the *lisan* peninsula in Arabic; *ha-lashon* in Hebrew), from which the 'lisan marl' derived its name.

This well-known standard map of the Dead Sea was correct until the 1950s; a continuous lowering of the sea-level, however, has changed its outline. The 1:100,000 maps of the Survey of Palestine show the level of the Dead Sea (the lowest point on the surface of the earth) to have been -392 m. relative to the level of the Mediterranean Sea in 1935 and 1938. The 1:100,000 maps of the Survey of Israel show a progressively lower level: -400 m. for 1980,¹ -405 m. for 1986² and -408 m. for 1991.³ This means that over a period of 56 years between 1935 and 1991, the Dead Sea level was lowered by 16 m.! At the time of writing, the level is even lower: -408.7 m.⁴

As mentioned above, the area dividing both basins consists of the Lisan Peninsula in the east with an altitude of -310 m. to -370 m., its highest point being -295 m. A low muddy area to its west has a minimum breadth of 4 km. (east to west) and a length of 8 km. (north to south). Even in the past this shelf was so shallow

* This paper was submitted for publication in October 1995. The *Ariel* Hebrew series has recently devoted an entire volume (116 [July, 1996]) to *Eretz-Israel in the Madaba Map*. It contains a contribution by N. Kadmon on the cartographic aspects of the map (pp. 89-96); he discusses various possibilities for the configuration of the Dead Sea without the Lisan Peninsula (pp. 93-94).

1 Sheets 11-12, edition of 1981.

2 Sheets 11-12, edition of 1987.

3 Sheets 15-16, edition of 1991.

4 Information courtesy of Dr. Cippora Klein.

that caravans of mules or donkeys could pass it on a ford, as witnessed by Irby and Mangles in June 1818.⁵

Had the lowering of the Dead Sea level continued unimpeded, the shallow south basin would have fallen dry by now. However, since the Dead Sea Works on the Israeli side and its Jordanian counterpart in the east have converted the south basin into extensive evaporation pans, channels were dug feeding water from the deep north basin into these evaporation pans to ensure their continuing operation. Without these feeder canals the Dead Sea would have had a similar configuration nowadays to the one shown on the Madaba map, i.e. without the south basin.

There are two reasons for the present recession of the Dead Sea level. One is man-made: there has been a reduction of water flowing into the lake from the Jordan River and possibly from some of the smaller rivers on the eastern shore (the Arnon, etc.). This is due to the construction of storage dams on the Jordan River for the power plant of the Palestine Electric Corporation at Naharayim and in 1930 at Degania near the outlet from the Sea of Galilee (Lake Tiberias). In addition, both Jordan and Israel withdraw water from smaller tributaries for local irrigation projects.

A no less important factor seems to be the climate, which in this semi-arid area brings about series of abnormally dry years. Since the 1950s, Jerusalem has recorded periods of six and three consecutive years with accumulated rainfall deficits of 36.7% and 21.7% respectively. In the late 1980s, Israel experienced a serious water shortage as a result of a number of years of rainfall deficiency. Mount Cana'an in Eastern Galilee had a three-year period with a 30% deficit; Beersheba had one six-year period with a 40.4% deficit and one of five consecutive years with an accumulated deficit of 24.6%.⁶

It stands to reason that the depiction of the Dead Sea on the Madaba mosaic map represents a period of unusually dry climate which caused a recession of the lake level, and consequently, the south basin fell dry. According to M. Avi-Yonah, to whom we owe an excellent reproduction and analysis of the map, the Madaba map should be dated to 560–565 C.E.⁷ One can, therefore, consider the Madaba map to be evidence for an extraordinary dry period in Israel in the 560s.

5 C.L. Irby and J. Mangles: *Travels in Egypt and Nubia, Syria, and Asia Minor during the Years 1817 and 1818*, London, 1823, p. 454.

6 D.H.K. Amiran: *Rainfall and Water Management in Semi-Arid Climates: Israel as an Example* (Jerusalem Institute for Israel Studies, Research Report 18), Jerusalem, 1995, pp. 35–36, Table 6.

7 M. Avi-Yonah: *The Madaba Mosaic Map*, Jerusalem, 1954, p. 18. D. Bahat (A New Suggestion for the Dating of the Madaba Map, *Ariel* 116 [1996], pp. 74–75 [see above, n. *]) suggests that the Madaba map should be dated to about a century later, i.e. to the second half of the seventh century C.E., based on an assessment of certain parts of buildings presented in the map. This would post-date the period of dry climate to the second half of the seventh century C.E.

If these considerations are correct, credit should be given to the late Prof. I. Schattner, who years ago did not accept the conception current at the time that the Dead Sea had been wrongly represented on the Madaba map because its author had no personal or correct information about its configuration. Schattner claimed in the 1960s that the Madaba map showed the Dead Sea without a south basin because its level had receded a number of metres as the result of an abnormally dry period.⁸ The development over the last 25 years shows that Schattner's interpretation was correct.

The possibility of a quantitative evaluation is suggested by Dr. Cippora Klein.⁹ If the boats on the Dead Sea depicted on the map used the ancient harbour of Ma'aganit ha-Melah (Rujm el-Bahr) on the northern shore of the lake as their landing point, this would indicate a lake level of *c.* -400 m. below sea-level for the 560s.¹⁰

8 I. Schattner: personal communication.

9 C. Klein: *Fluctuations of the Level of the Dead Sea and Climatic Fluctuations in Israel during Historical Times*, Jerusalem (forthcoming).

10 For some additional details and sources, see D. Amiran: *The Dead Sea and the Judean Desert (Studies in the Geography of Israel, New Series 8)*, Jerusalem, 1972, pp. 129–136 (Hebrew).